

# *Impact of Satellite Observed Land Surface Data on NCEP Short Term Forecasting*

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## **1. Landuse - Landcover Class (LULC)**

(Parallel testing on Summer 2010)

Fixed field of MODIS-based global 1-km land use class (aka "vegetation class") -- from Boston U. (Mark Friedl PI) via JCSDA

## **2. Green Vegetation Fraction (GVF)** (Summer 2010)

Real-time weekly AVHRR-based global 0.144-degree green vegetation fraction (and the companion 25 yr. climatology weekly data) from Le Jiang and Wei Guo of NESDIS

### **3. Albedo** (Fall 2010)

Monthly climo of MODIS-based global 0.05-deg land surface albedo (to be treated as snow free albedo) -- from Boston U. (Mark Friedl PI) via JCSDA

### **4. Max Snow Albedo** (Fall 2010)

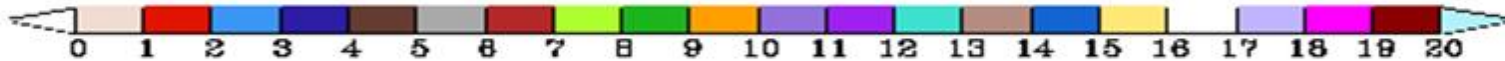
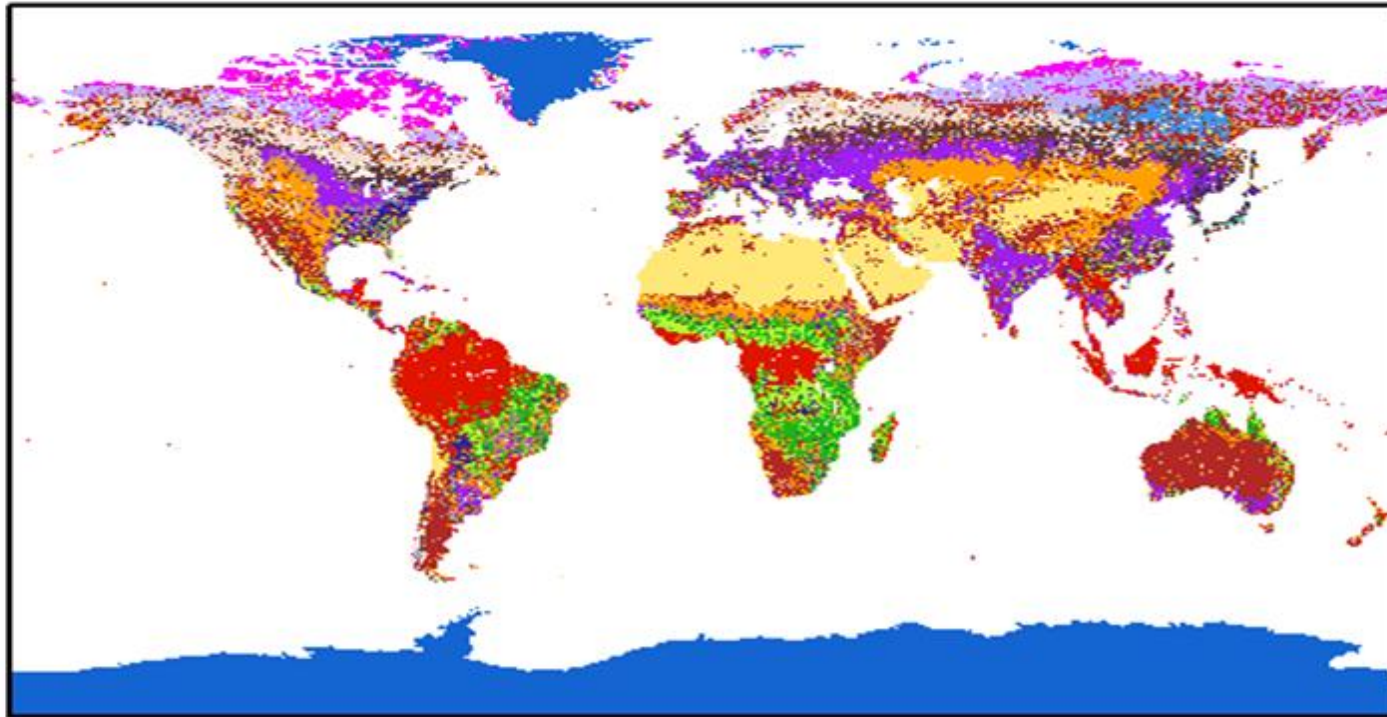
Fixed field of MODIS-based global 0.05-deg land surface albedo for deep snow conditions (what we call "max snow albedo") from U. Arizona (Xubin Zeng) via JCSDA

### **5. Leaf Area Index (LAI)** (Fall 2010)

Monthly climo of MODIS-based global 0.05-deg land surface LAI -- from Boston U. (Mark Friedl PI) via JCSDA

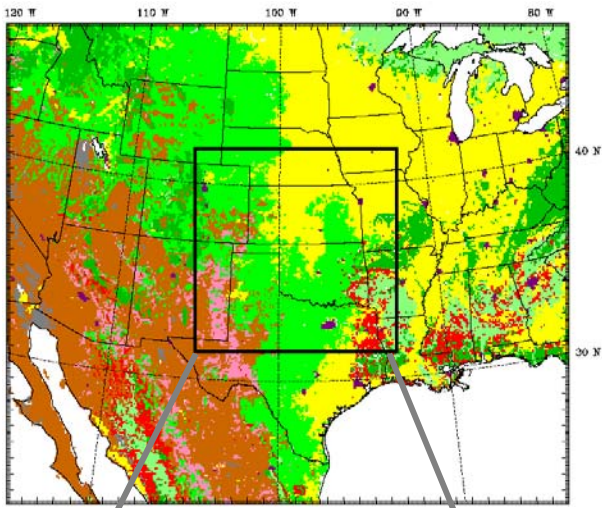
Note: As these data sets cover the whole globe, these data are useful for various regions, and in the global (GFS) and climate (CFS) models too.

# IGBP\_MODIS+Tundra 1km Land Cover

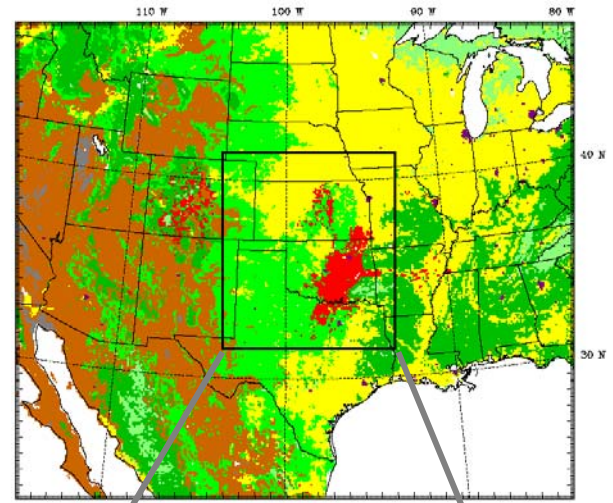
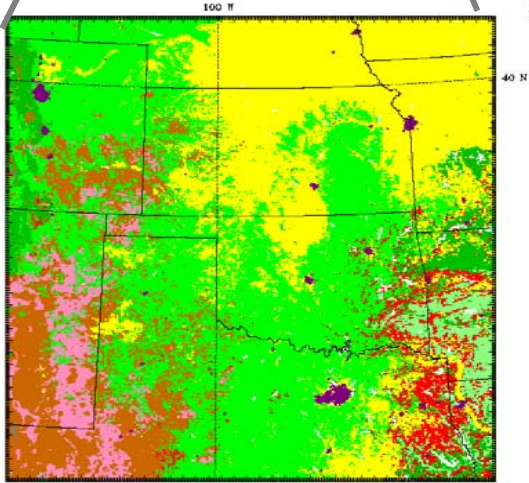


- |                                 |   |                        |
|---------------------------------|---|------------------------|
| 1. Evergreen Needleleaf Forests | 9. Savannas                             | 15. Snow and Ice       |
| 2. Evergreen Broadleaf Forests  | 10. Grasslands                          | 16. Barren             |
| 3. Deciduous Needleleaf Forests | 11. Permanent Wetlands                  | 17. WaterBodies        |
| 4. Deciduous Broadleaf Forest   | 12. Croplands                           | 18. Wooded Tundra      |
| 5. Mixed Forests                | 13. Urban and Built-Up Lands            | 19. Mixed Tundra       |
| 6. Closed Shrublands            | 14. Cropland/Natural Vegetation Mosaics | 20. Bare Ground Tundra |
| 7. Open Shrublands              |   |                        |
| 8. Woody Savannas               |   |                        |

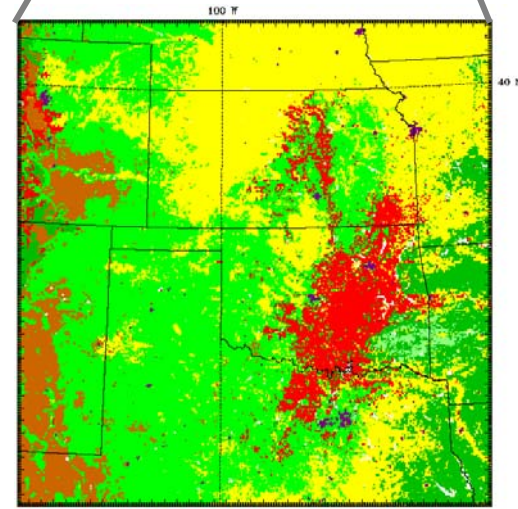





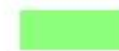



**MODIS**



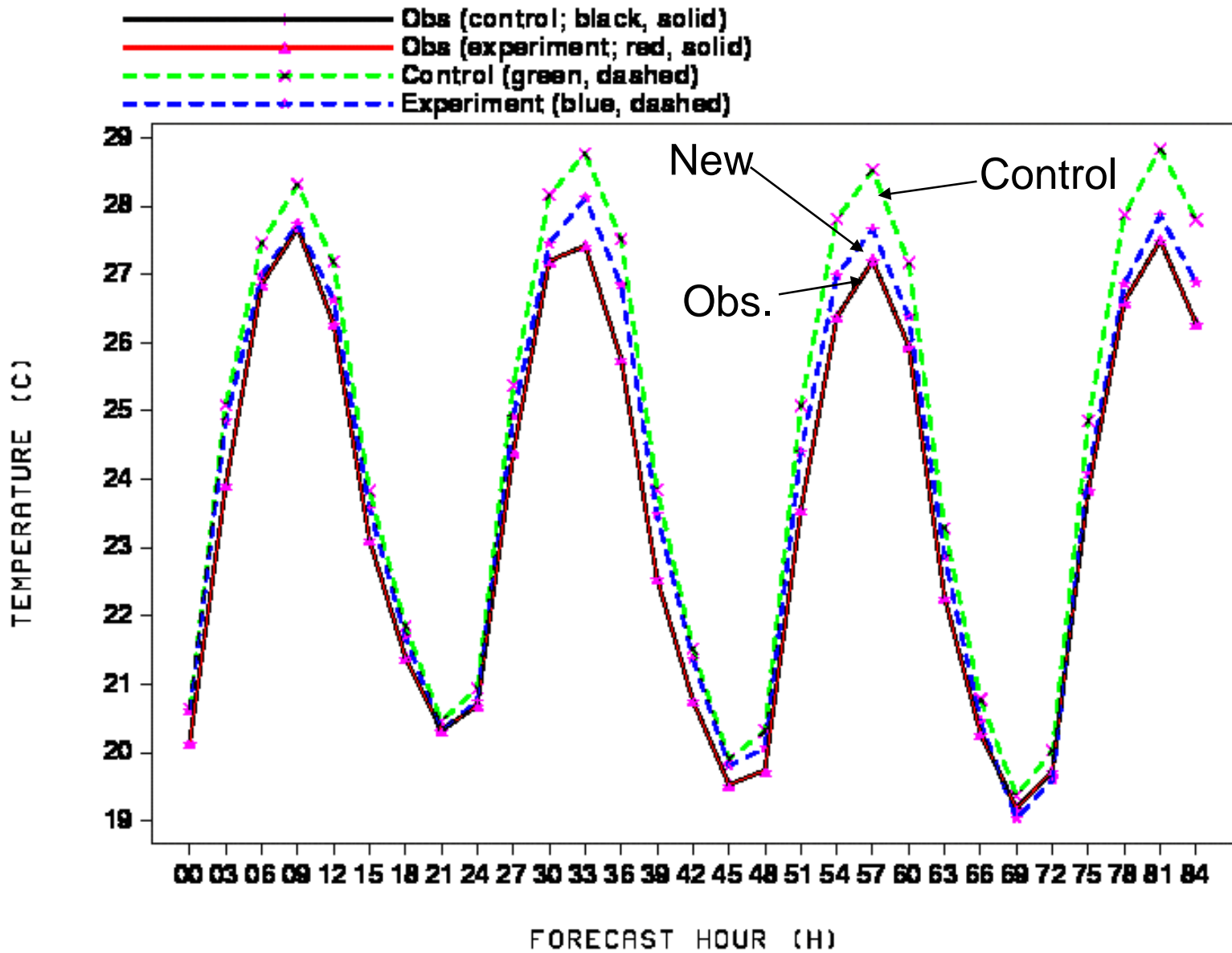
**USGS**



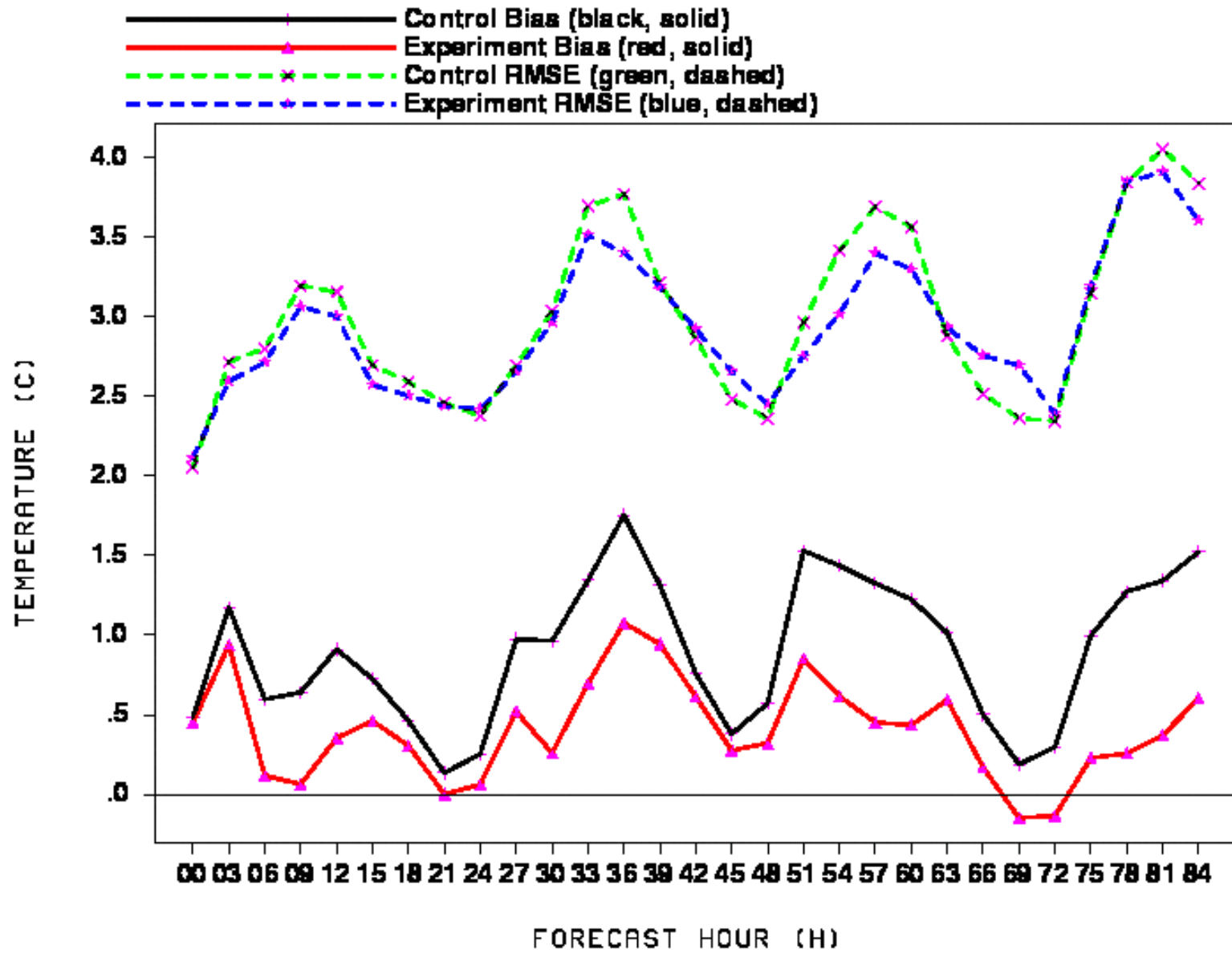
-  Urban and Built-Up Land
-  Dryland/ Irrigated and mixed
-  Cropland/Grassland mosaic
-  Grassland
-  Shrubland
-  Savanna

-  Deciduous/Evergreen Forest
-  Mixed Forest
-  Herbaceous/ Wooded Wetland
-  Barren or Sparsely Vegetation
-  Wooded/Mixed Tundra

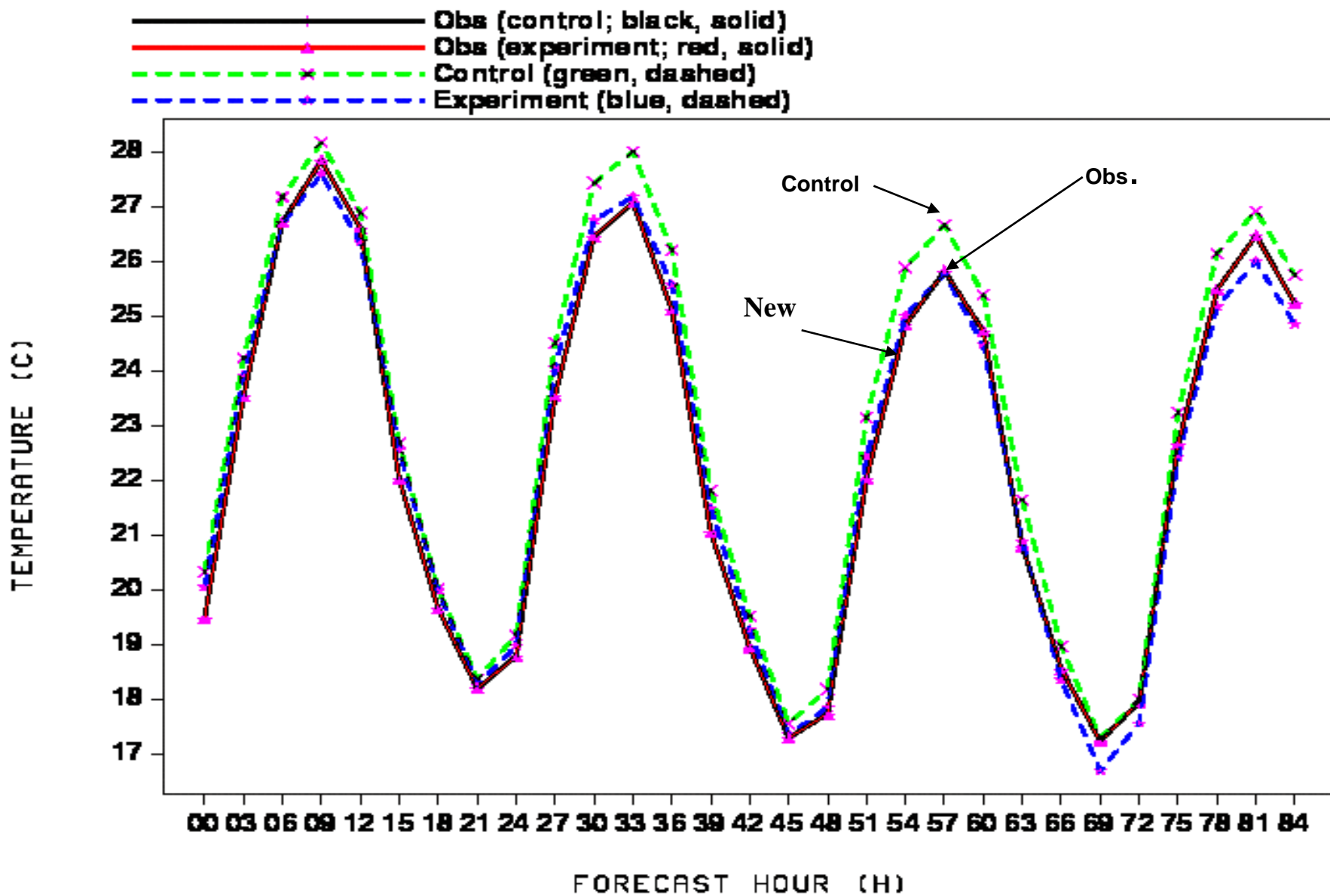
# Ctl vs. Exp from grid 218 over CONUS for 2008070712



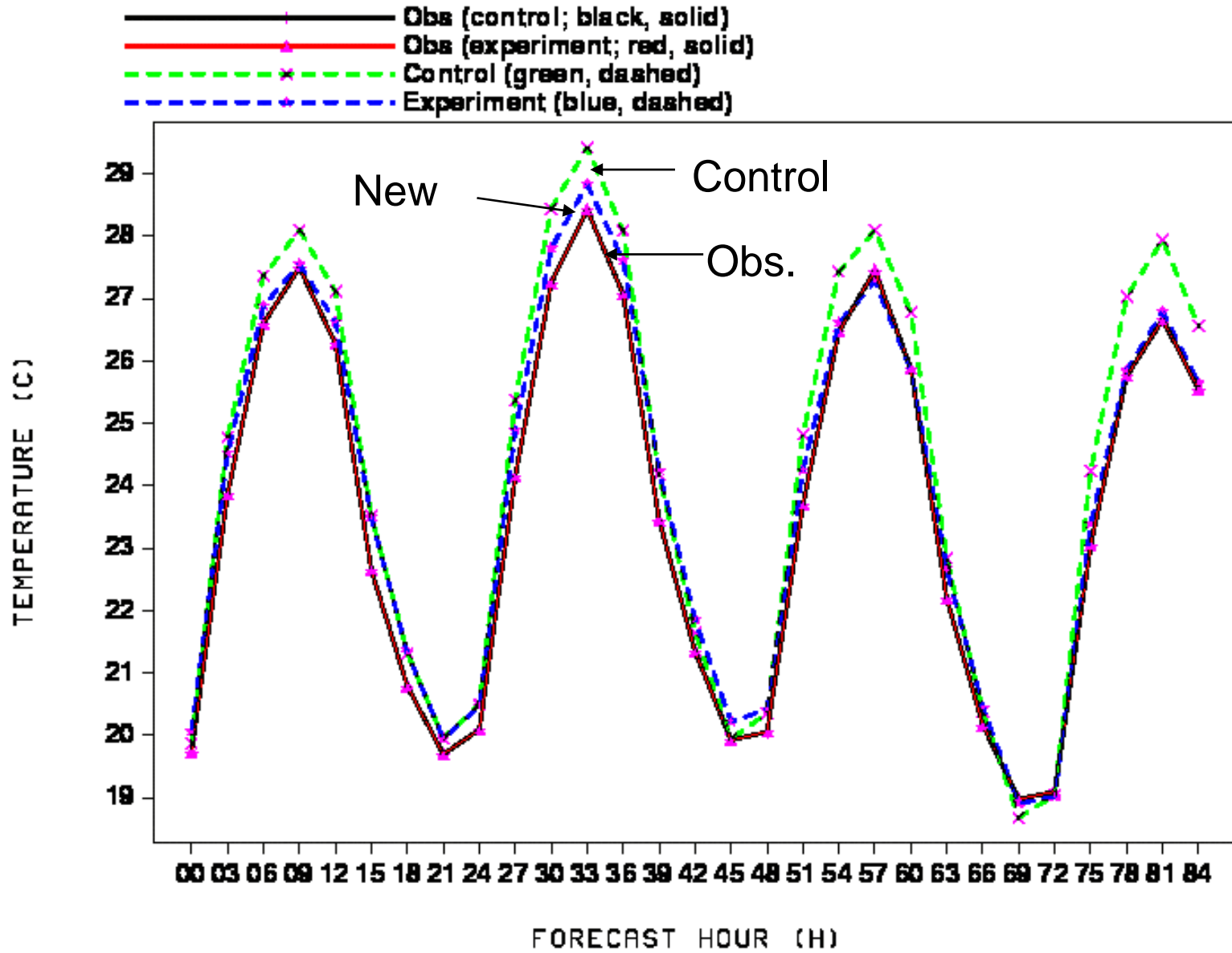
### Ctl vs. Exp from grid 218 over CONUS for 2008070712



### Ctl vs. Exp from grid 218 over CONUS for 2008070112



# Ctl vs. Exp from grid 218 over CONUS for 2008071012



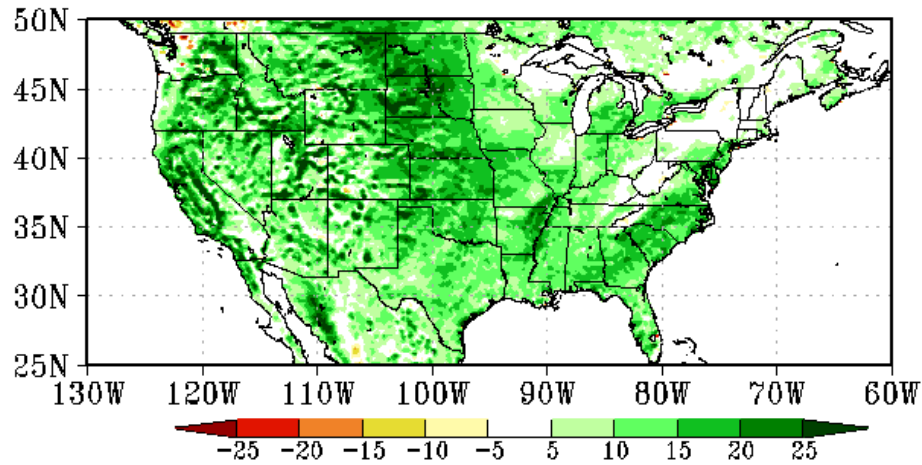


# Comparison of GVF Over CONUS

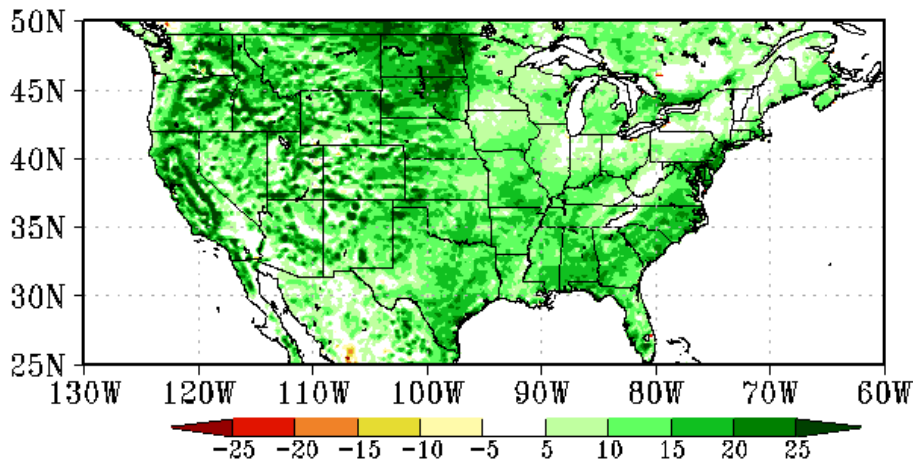
## Climatology Differences

**New\_Clim – Old\_Clim**

**Case 1: Jul. 02 ~ Jul. 18 2006**



**Case 2: Aug. 15 ~ Aug. 31 2007**

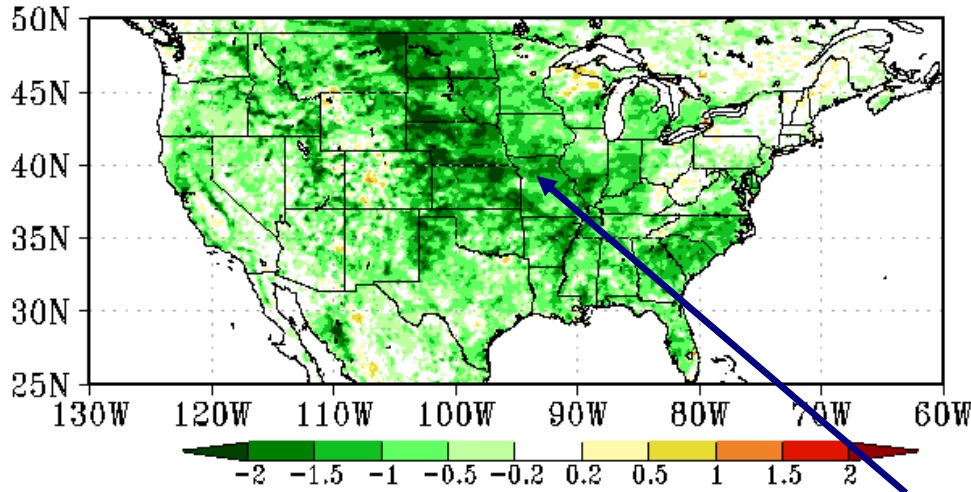


**New Clim data has higher  
GVF**

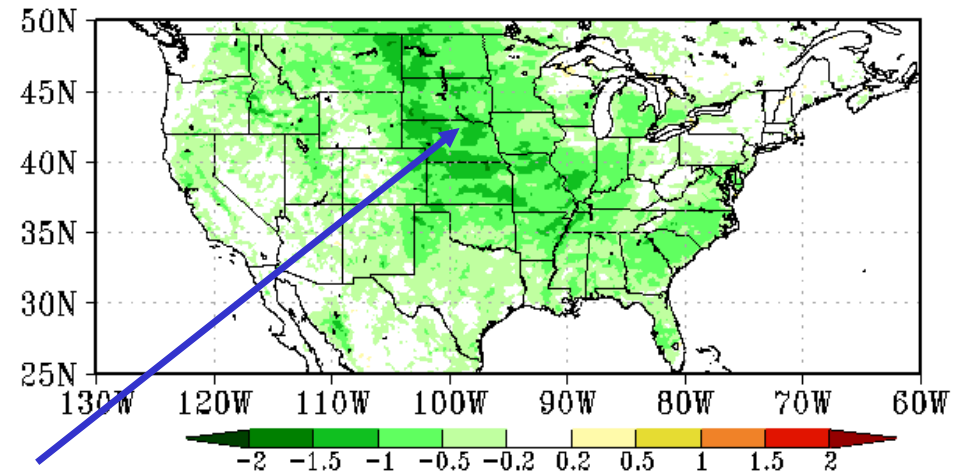
# Impact of Climatology Differences

Study 1: **New\_Clim – Old\_Clim**  
At 33h (21:00 UTC)

**Surface Skin Temp.**

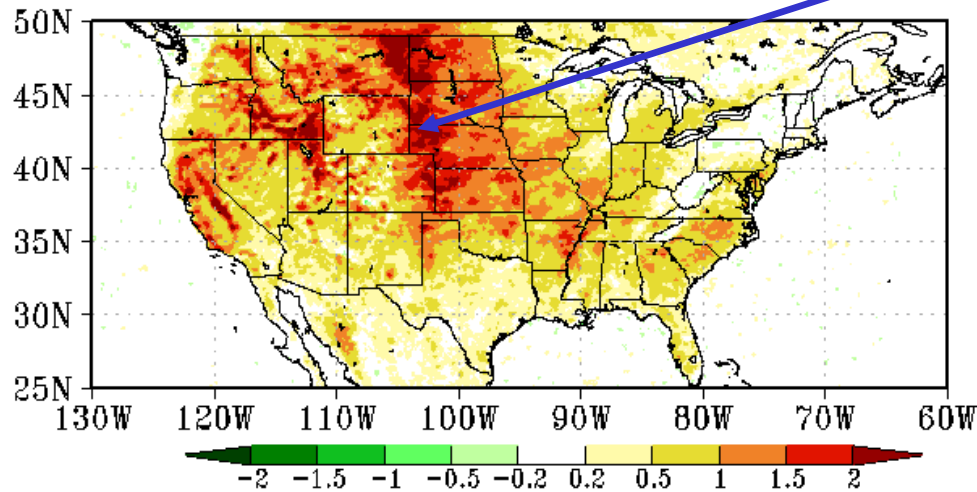


**2 m Temp.**

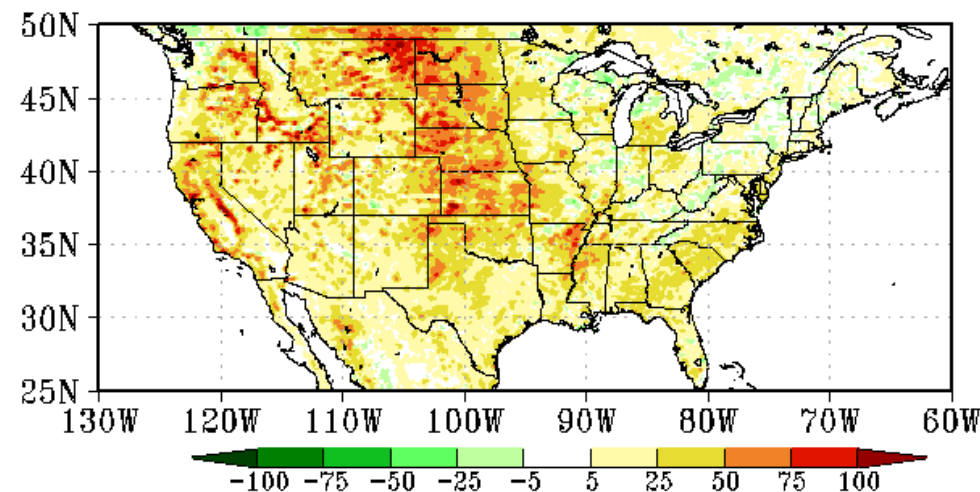


Cooler and moister surface

**2m Dew Point Temp.**



**Latent heat flux**

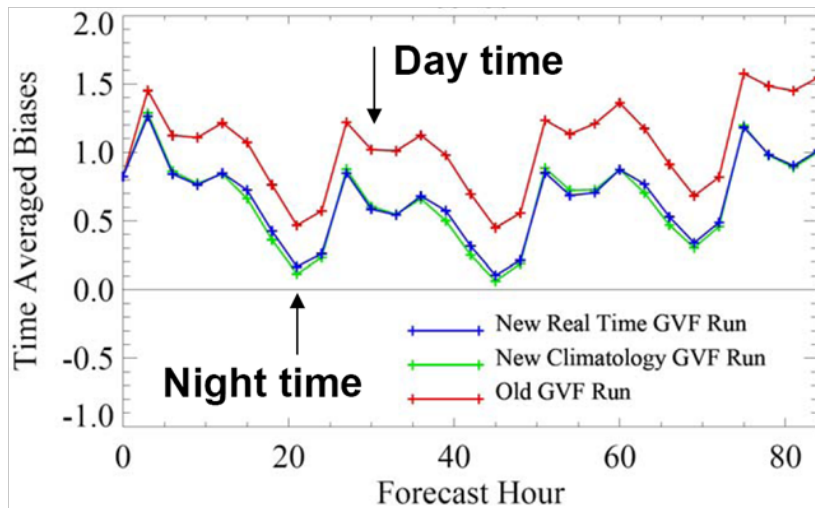


**Case 1: July 02 ~ July 18 2006, continental USA**

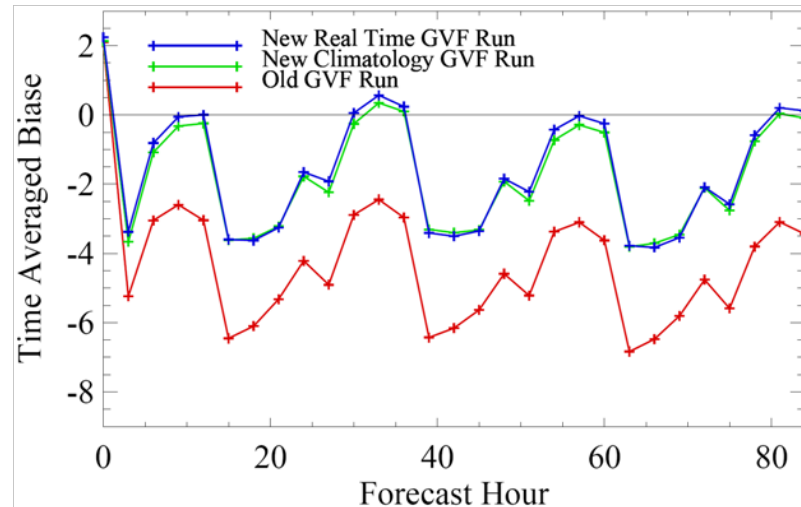
# Improved WRF Launcher 2-m temperature and RH forecasts using NESDIS new GVF data

**Bias**

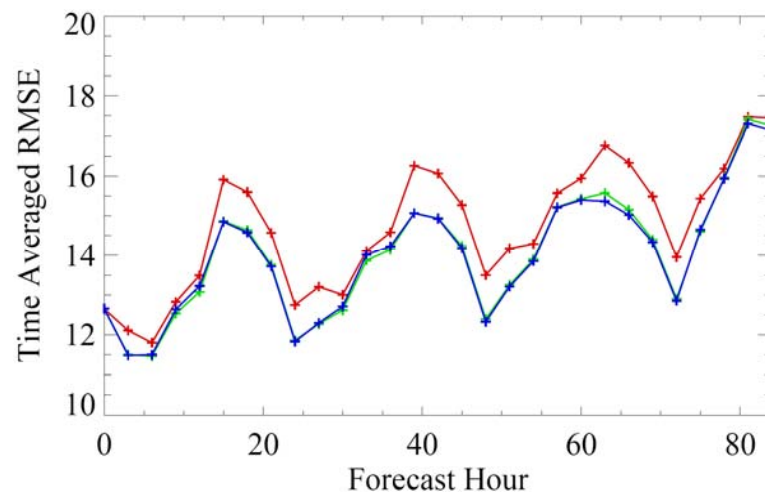
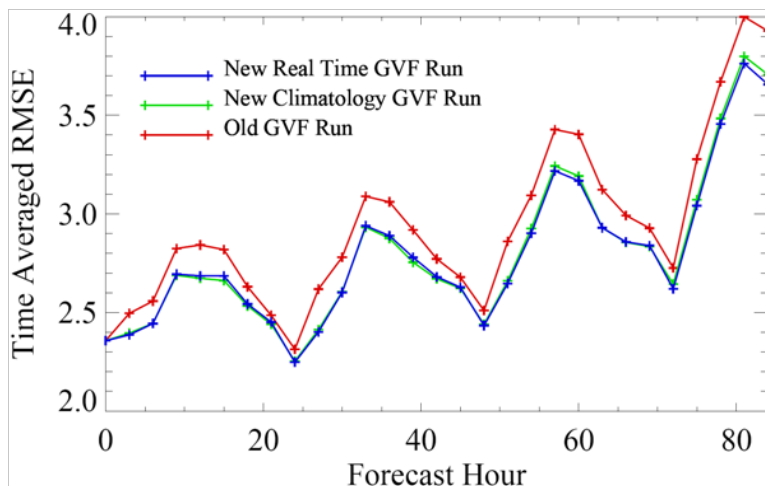
### 2-m Air Temperature (°C)



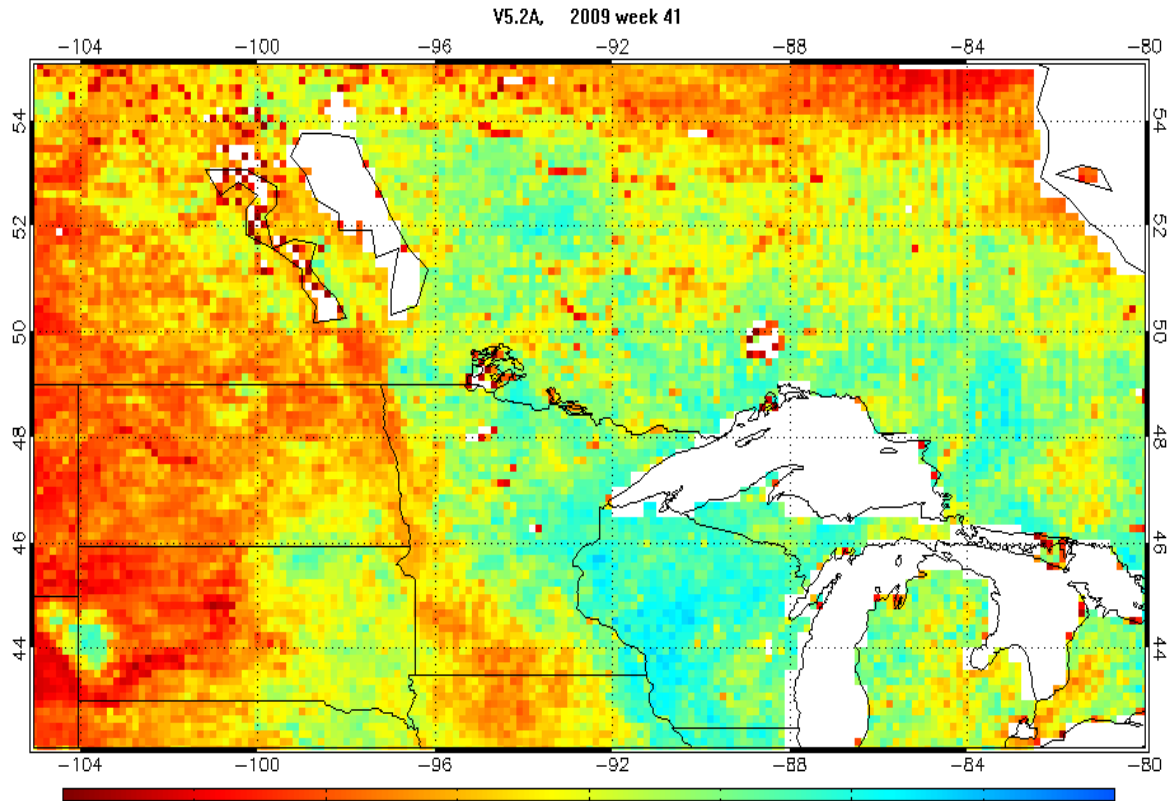
### 2-m Relative Humidity (%)



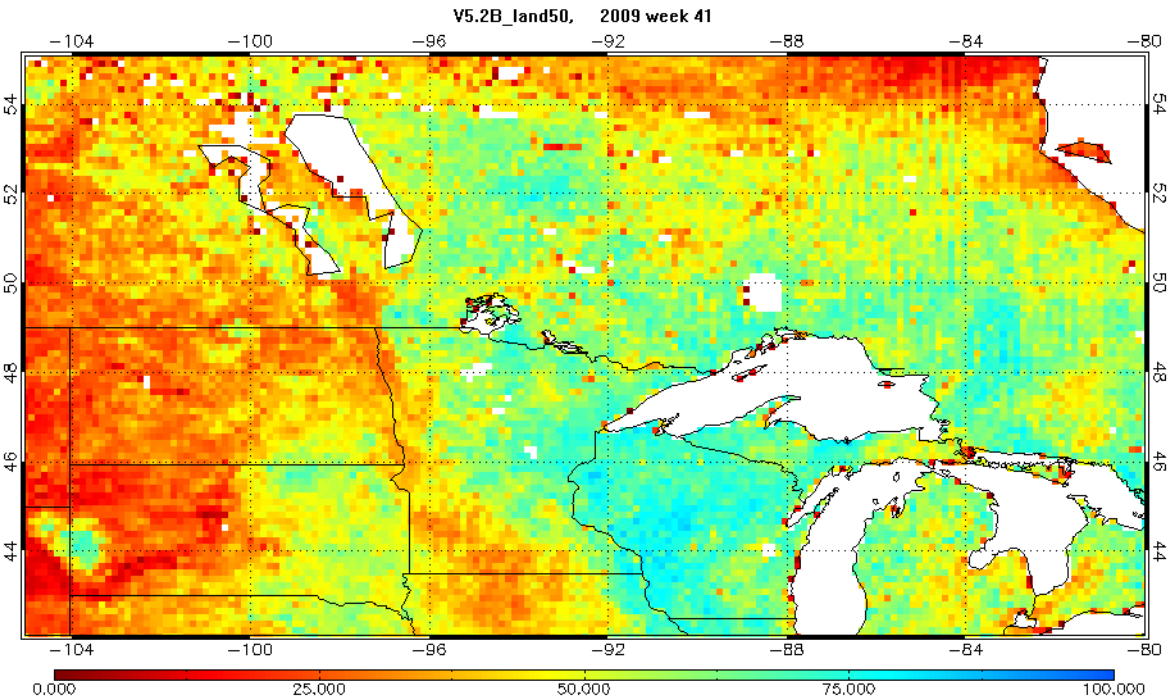
**RMSE**



**Case 1: July 02 ~ July 18 2006, continental USA**



GVF  
 (With 1 degree resolution  
 Land-Sea Mask)

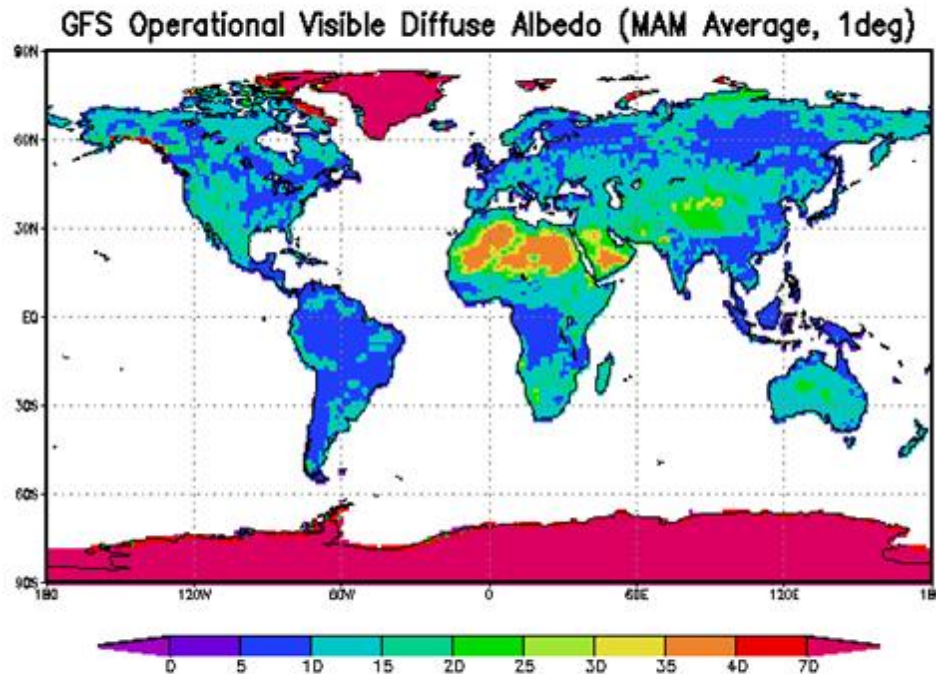


GVF  
 (With 0.144 degree resolution  
 Land-Sea Mask)

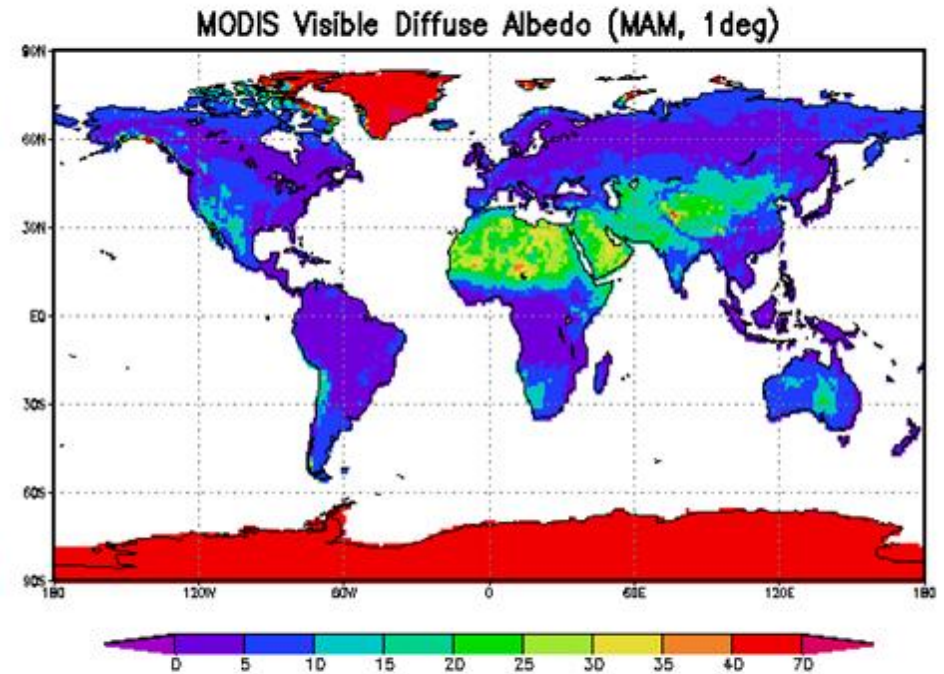


# Snow-free Visible Albedo

**NCEP Operational Albedo (1-deg)  
Spring Season (Mar-May)**



**NCEP Test Bed Albedo (MODIS-based)  
Spring Season (Mar-May)**



**In the case of the visible diffuse band,  
the MODIS-based albedo is darker.**

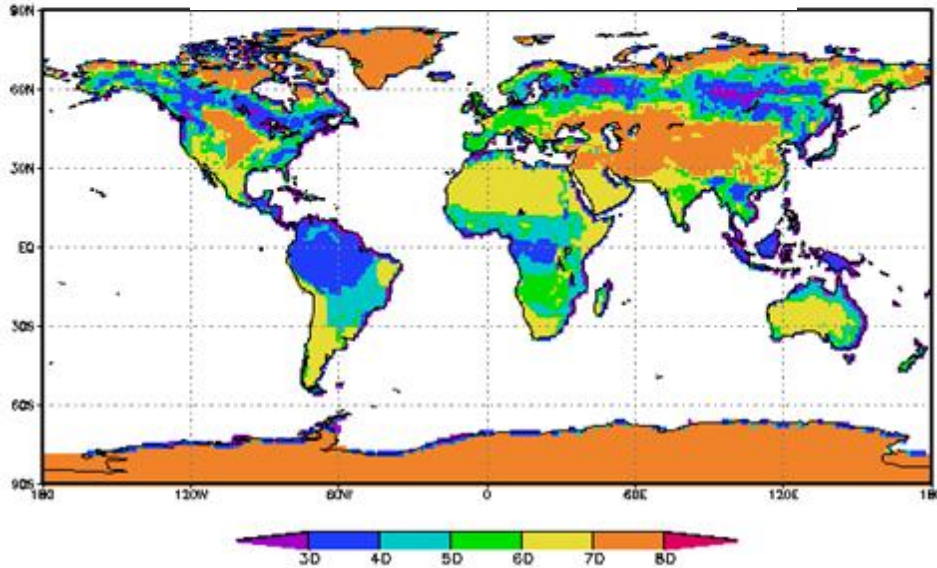
Above MODIS-based albedo spatially averaged from its native 0.05-deg resolution and temporally averaged to quarterly from its original monthly frequency, to allow comparison with NCEP operational product.

Mark Friedl et al., Boston Univ.

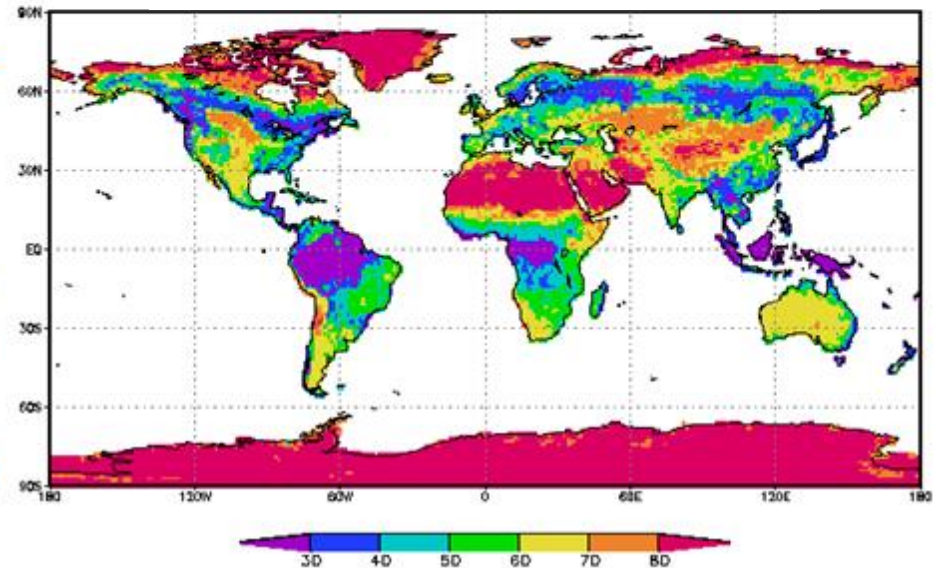


# Max Snow Albedo

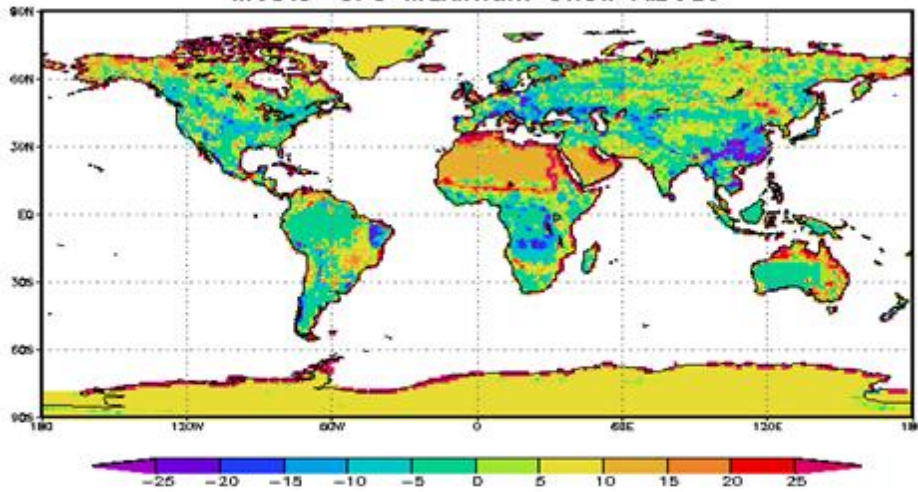
Operational GFS



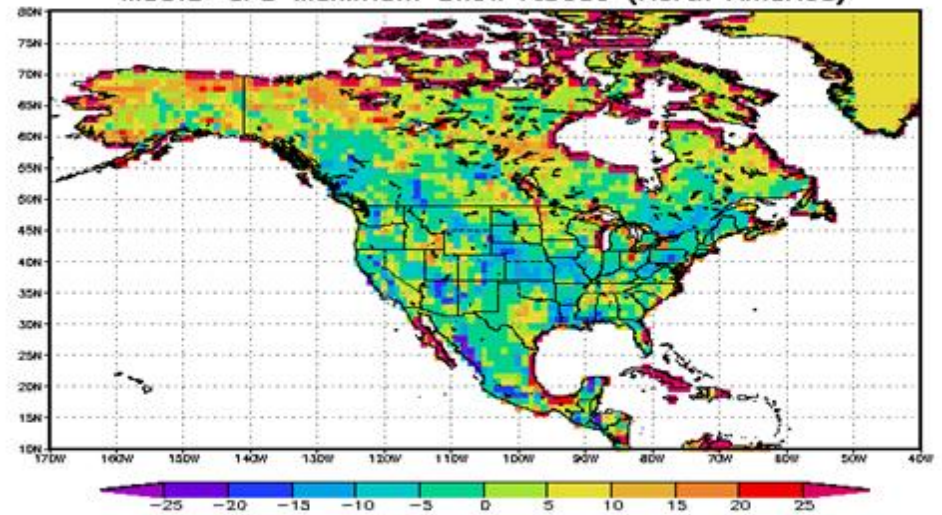
MODIS



MODIS-GFS Maximum Snow Albedo

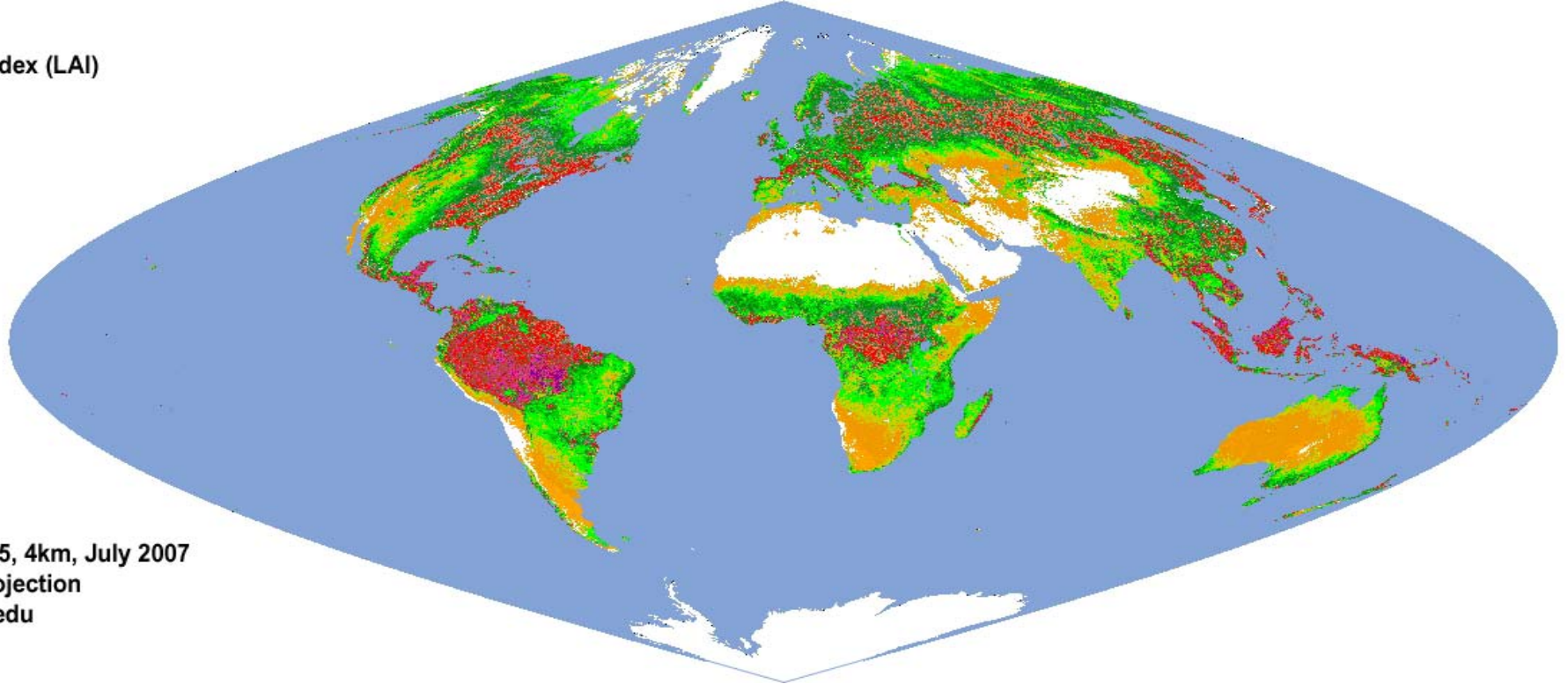
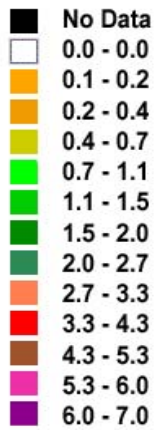


MODIS-GFS Maximum Snow Albedo (North America)



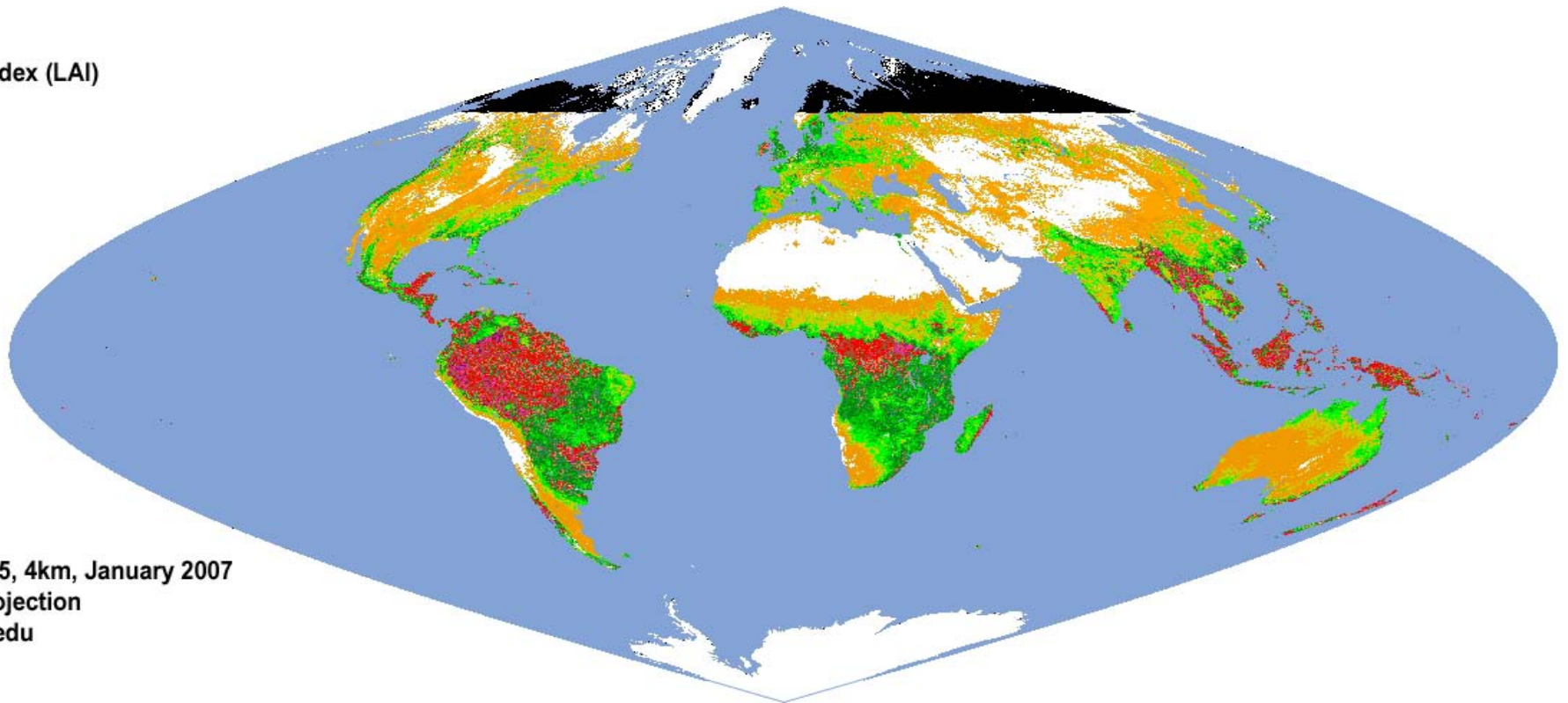
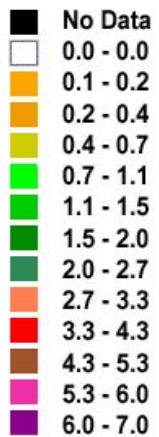


### Green Leaf Area Index (LAI)



MODIS, Collection 5, 4km, July 2007  
Sinusoidal Map Projection  
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### Green Leaf Area Index (LAI)



MODIS, Collection 5, 4km, January 2007  
Sinusoidal Map Projection  
rmyneni@crsa.bu.edu